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ABSTRACT

Some students do not "take to" computers as a learning tool. Reasons for this include inappropriate software; use of the same software for all students rather than accommodation of different interests, needs, and learning styles; and various handicaps (both physical and mental). For example, many students prefer a holistic approach; others a skill and practice approach. Effective results with computer programs can be obtained by a knowledgeable teacher who considers the uniqueness of each child a challenge and discovers students' learning styles, perhaps utilizing a Learning Style Inventory. Subsequent to a determination of each student's learning style, software selection requires considerable thought. Interviews with university students and a review of relevant literature validates the idea that computer software can support instruction for various learning styles but not without the high quality help of a knowledgeable, creative, and caring teacher who recognizes, respects, and provides for the many differences among students and who realizes that computer learning may not be for everyone. These views are illustrated by many of the assessments of the "Writing to Read" computer program sponsored by International Business Machines. The paper concludes with a list of 12 implications of this study. (Contains 10 references.) (LL)

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EFFECTIVE USE OF COMPUTERS IF DIFFERENCES AMONG STUDENTS ARE TO BE ACCOMMODATED

by

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Effective Use of Computers if Differences Among Students Are to Be Accommodated

Computers have now been in our schools long enough for concerned educators to conclude that some students, both the young and the older, do not "take to" computers. There are felt to be a number of reasons for this, among them, inappropriate software, using the same software for all students, not accommodating different interests among students, different needs, different learning styles, and various handicaps (both physical and mental.) It is believed that paying heed to the above would help more students "take to" the computer and would enable those who do "take to" the computer to profit by and enjoy computer programs much more when the above concerns are noted and respected in the use of computer programs.

A great deal of available software is presented in a step-by-step manner, and there are students who do not process information in this manner. The software used with an individual must be suitable for his/her learning style. Some students prefer a holistic approach; others a skill and practice approach. Therefore, for success with computer programs, students' learning styles must be determined. What is learning style, and how is it accurately determined? Gene Geisert and Rita Dunn (3) explain:

> Although there are many definitions of learning style (DeBello 1990), essentially all of the major theorists agree that one's learning style is composed of consistent patterns of how an individual begins to concentrate on, process, internalize, and remember new and different information. To identify a person's learning style, one must examine each individual's multi-dimensional characteristics to determine what is most likely to trigger and maintain each person's

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> concentration and cause the person to respond to his natural processing style and retain the information in long-term memory. To reveal those characteristics, teachers must use a comprehensive model of learning style because different people are affected by different elements of style, and each of the elements is capable of increasing academic-achievement -- for those to whom that element is important -- within a relatively short amount of time, often six weeks. (Dunn 1990a)

Apparently, there are only three comprehensive models of learning style in existence, and the Dunn, Dunn, and Price (1989) model has been credited as the one with the highest reliability and validity. Since it is extremely difficult for teachers to identify correctly all the elements of learning style theory, it is felt that a Learning Style Inventory might well be very helpful. A description of the Dunn and Dunn learning styles model follows:

> The Dunn and Dunn learning styles model includes twenty-one elements that, when classified, reveal which learners are affected by the following: (a) their immediate environment (sound, light, temperature and furniture/seating designs; (b) their own emotionality (motivation, persistence, responsibility (conformity/nonconformity), and the need for either externally imposed structure or the opportunity to do things their own way); sociological preferences (learning alone, in a pair, in a small group, as part of a team, with an authoritative or collegial adult, and wanting variety as opposed to patterns and routines); (d) physiological characteristics (perceptual strengths, time-of-day energy levels, and need for intake or mobility while learning); and/or processing inclinations (global, analytic; right brain/left brain, and impulsive/reflective).

Having determined the learning style of each student, the selection of software requires considerable thought. Interviews

with students, selected at random, at a prestigious university, revealed some food for thought.

A graduate student specializing in English, though basically a holistic learner, said that she often likes to pause, reflect, meditate and enjoy, even a phrase, in her reading. This remark was a personal reminder of an incident of many decades ago, and it makes known that age isn't a factor in this regard.

While reading a story about a little puppy, it was thrilling to find this expression, "A little puppy running down the street on the bias." Needless to say, I paused to meditate and enjoy, for my mother had recently explained to me what "on the bias" meant as she cut some material that way for a particular article she was making.

A young librarian, knowledgeable about computers and computer software, expressed her belief that it would be much easier for a student using a holistic program to pause to review, think and enjoy than it would be for a student in a program using a step-by-step approach to switch to a holistic style.

A freshman, who didn't own a computer, told of reading stories to a niece and nephew who are preschoolers. The children thoroughly enjoy the stories and eagerly await her reading. She explained that their interest was so high, she thought she would teach them to read. She purchased some workbooks designed to teach beginning reading and began to follow the step-by-step programs. The children begged to go back to the story reading, which she did, but with the intention of "sneaking up on them"

with some skills, using the story-reading content rather than the purchased material. She was warned to "take it easy" even with this change as any teaching at this point should be informal and pleasant and not detract from the story.

Many preschoolers are alert, inquisitive and observant. If, perchance, a little girl, Cindy, remarked when hearing the story about Cinderella, "Her name begins like mine, only hers is longer," an appropriate remark by the story reader might be, "You're right, Cindy. How clever of you to notice this." Such a remark would be encouraging to Cindy and, perhaps, encouraging and/or stimulating to other children.

This episode makes it clear that teachers must observe children, listen to children, and select programs, computer or otherwise, appropriate for their students' ages, their interests, their needs and their abilities, both mental and physical.

In regard to children's physical well-being, Dr. G.N. Getman (4), a distinguished pioneer in the field of optometry, has made it very clear that there are many developmental skills children must achieve before they are exposed to a microcomputer, and he says that many of these have not yet been achieved by millions of primary children. He is referring to such skills as eye-hand coordination, spatial orientation, figure/ground, visual-peripheral awareness, and attention span. Getman emphasizes, "There is no doubt among behavioral optometrists, who have spent many years attending children with visual difficulties, that the computer will be the most potent contributor to early, extreme nearsight-

edness in the children who drive themselves to mastery of it in spite of the stress." Teachers can observe this stress. Can the computer?

There are many factors that affect the various learning styles, among them, the physical, sociological, emotional and environmental. The computer can support instruction for the various learning styles, but high quality teaching must still be provided. Individual differences must be recognized, respected and accommodated; great selectivity must be practiced in the choosing of software if teaching is to be enhanced, children's enjoyment and achievement increased and any negative feeling against computers overcome. The latter seems important since we are living in a "computer age."

In regard to the present educational concern, the whole-word approach versus the part-to-whole approach, it is believed that there can be software to accommodate each approach. Furthermore, it has been learned from talking with people of various ages as well as from personal experience that a holistic learner, for example, might have need for a step-by-step program for a subject to which he/she brings little. The same might be said for the part-to-whole learner who might bring much to a specific topic and, therefore, not need the part-to-whole approach.

A child who lives on a horse farm and likes horses can probably bring a lot of "horse words" to a story -- oats, hay, bridle, saddle, canter, trot, gallop, etc. This knowledge might enable him/her to read and enjoy a simple "horse story" despite

his/her rather limited phonological knowledge. As a matter of fact, it might add to his/her phonological knowledge in a more interesting way than working in a step-by-step skills program. Therefore, it seems that there is need for both holistic and step-by-step skills programs, but that the right program must be used for the right child at the right time. A challenging problem for the teacher? Yes, but not insurmountable, and very rewarding when students benefit.

In a random sampling of young college students who were asked, "Would you rather be taught by a computer or a professor?", the preference for a professor was one hundred per cent. However, a first-generation elderly, retired gentleman, born and educated in America, preferred the computer and offered several valid reasons: "I'd go at my own pace and know where I was at all times. I'd remember the lesson better because I did the work myself."

It seems quite obvious that the human element must be reckoned with if the best interests of all students are to be served, as what they prefer isn't always best for them.

Students don't always choose what they need the most. A young woman said she loved the word processor because, as she put it, "I never could spell." A teacher understanding the human element might be a great help to this young woman in discussing the purpose of the word processor.

Enochs, Handley, and Wollenberg (2) found that CAI instruction "enhances achievement more for students favoring less

socialization" and that "higher achievement in the traditional self-paced instruction group was associated with those subjects having more people orientation in learning styles."

It is felt that favoring less socialization, though understandable, can, if carried to extremes, deny a person some of the knowledge and pleasures that socialization affords.

As a matter of fact, emotional bonding, by some, to the computer has been another concern. Great philosophers have written about this strong attraction to machines as resulting in an indifference toward life instead of a great respect for it. They seem to feel that the computer could become a substitute for humans, especially as the processing of computer information becomes more and more like human thinking.

Recently, an article, "Illiterates Find Computers Are Patient Teachers" was found in The Wall Street Journal. Authored by William M. Bulkeley (1), it included testimonials from adults as to the help they have received from computer programs. This has allayed their fears of losing a job and not finding another.

A 44-year-old exterminator who finally learned to read using an experimental program at the Street Literacy Clinic in Harlem said of computers, "They will read something over 100 times without saying, 'You know that word. I just told you that word'."

A 56-year-old housecleaner who was taught to read by computer, after traditional methods had failed, wrote a letter to her mother. "She was so proud of me!" Mrs. T. exclaimed.

Beverly Waldrop, associate director for occupational and adult education with the Illinois Community College Board says, "It give them more self-esteem. They say they are going to college and working on a computer."

With no intention whatever of discrediting these testimonials, it is believed that some educators would have preferred early intervention and the selection of a program geared to the needs of each individual, as this might well have saved years of embarrassment and "pretending" for these adults.

It is believed that there are links between the computer and the humanities, not just between the computer and mathematics as some assume. The need for sound software to accommodate the many different needs, interests and learning styles found in a classroom is, indeed, a challenge to software producers and to teachers who would use it effectively.

At a two-day convention for software producers, held in Durham during October of '92, it was acknowledged that software producers face hard issues. Paul Gilster (5) whose article, "Software Firms Face Hard Issues", appeared on October 13, 1992 in The News and Observer, a Raleigh, North Carolina newspaper, was concerned with the two-day convention at which more than fifty teams from as far away as Australia were involved in designing a database for the Duke University Primate Center. Software developers were pitted against each other to see who could write the best database package in six hours. Partnering and networking were recommended for the good of all concerned.

These recommendations, if put into practice, might result in better software programs -- programs that when put to use in the various schools "could pass the test of time". "Writing to Read," a program developed by John Henry Martin, J.H.M. Corporation, and backed by IBM through a loan of the computers, was put to a two-year experiment (1982-1984) and was deemed successful. Subsequently, IBM bought and marketed the program, and a number of success stories were heard from schools using it. Fairly recently, however, some different reports are being heard.

Robert E. Slavin (9) is among those who have been making extensive studies of the long-term effectiveness of the program and whose findings are found in reputable educational periodicals. Slavin's studies evaluating evaluations of the program found that "the evaluations done to date simply do not support the effectiveness of 'Writing to Read' as a means of improving the reading achievement of young children."

It is Slavin's belief that it is only the long-term studies "which really provide the most damning evidence related to reading outcomes." This was in keeping with a conclusion reached by Partridge (7) in 1984. She reserved judgment "until the following questions were answered."

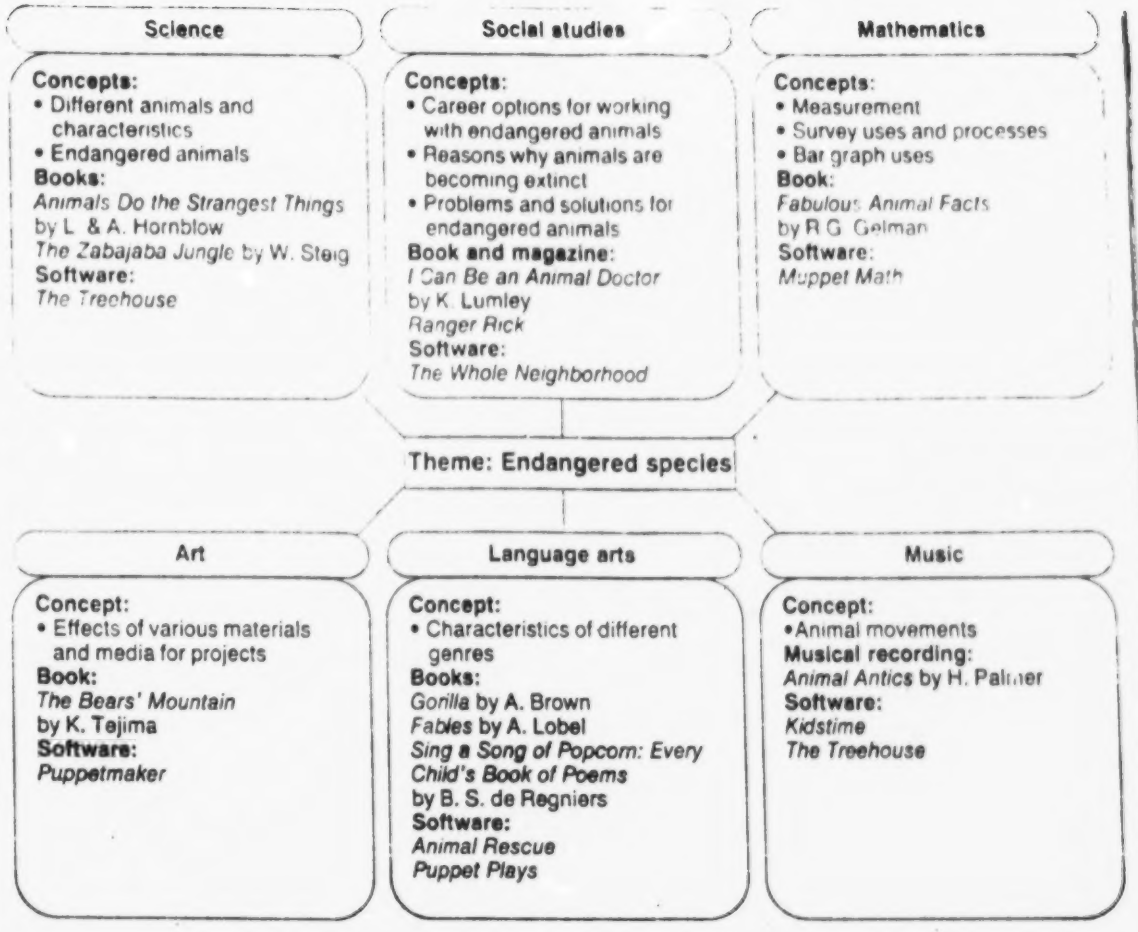
> How will the participants in "Writing to Read" be reading several years from now? Will they have a favorable attitude toward reading? How will their reading abilities and attitudes compare with those of their peers who did not participate in the experiment?

Dorothy Huenecke (6) has offered a new perspective on "Writing to Read." She based her criticism on observation, using ethnographic methodology, from the program's inception in the spring of their kindergarten year until they had completed the program in December of their first grade year.

She observed that time governed every aspect of the program, caused an excessive amount of waiting and also led to unnatural stopping when, for example, children engrossed in work had to stop before reaching closure. She found this a continuing problem at the "Making Words" station and at the writing station.

Her observations led her to conclude that "within the confines of the design, the intended program offers symmetry, variety and continuity," and when considered as a script or a score, "it has balance and coherence"; however, she found "problems appear in the enactment."

It is believed that these "long-term investigators" do not want to discredit "Writing to Read." It is felt that they believe their evidence might be considered by IBM as a means of restructuring the program in the interests of all concerned. Some educators believe that developing important concepts and skills across curriculum areas would provide the opportunity for using software from different content areas to support students' literacy development. Shelley B. Wepner (10) is one who has contributed a "success story" supporting this belief. Following is a chart she offered for showing a cross-curricular technology web for an endangered species theme.



Adapted with permission (from Elsie Nigohosian and Merrill/Macmillan) from Wepner, S. B., & Feeley, J. T. (in press). *Moving Forward with Literature: Basals, Books, and Beyond*. Columbus, OH: Merrill/Macmillan.

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It will be noted that The Treehouse package was listed on Wepman's chart. She had this to say: "As with The Treehouse, many software packages contain additional programs or components that can be used for different goals within and across content areas for the same unit or other themes.

She continued with some remarks which are felt to be encouraging to teachers; the remarks follow: "Familiarity with just one or two packages presents many opportunities for using the same software repeatedly for different curriculum proposes. As we continue to move away from ready-made packages for learning in favor of more integrated units of study, we can look to software as one of the many resources that facilitate meaningful curriculum connections.

It is believed that Wepner's use of both books and software can accommodate many more individuals and that it can help and encourage teachers in their selection of appropriate software for the concepts they wish to develop.

Another reported success story, "Computer Applications: A Schoolwide Innovation," by Joseph Sanacore and Al Alio (8) follows:

The successful implementation of the computer application program at the Hauppage, N.Y. Middle School involves all students who work on computers located throughout the school. It was set up by members of the English department, and they now staff the computer lab. The interest in establishing the program stemmed

from wanting the children to be prepared for our technological world and to see links between the humanities and technology.

All students take ten weeks of computer applications each year. The computer laboratory is used nine periods a day for group instruction, and individuals have access to it for forty minutes before school begins.

The three components of the seventh-grade program follow: Students are introduced to computers in general before being taught the specifics of the Apple computer. They use the PFS: WRITE program to learn word processing. They are then introduced to basic graphic techniques and programs with the word processor.

The entire program is to be evaluated and updated. Several revisions are already anticipated. They are reported as follows:

1. More broadly based application for using computers in language areas as well as in other subject areas.
2. Better attempts at helping students transfer what they learn in the computer lab to their computers at home.

Though some educators may question certain aspects of the program, for one example, the fact that it was set up by members of the English department who now staff the computer lab, the plan to evaluate and update the program is commendable.

Conclusion

It is concluded that the computer can support instruction for the various learning styles but not without the high quality help of a knowledgeable, creative and caring teacher who recognizes, respects and provides for the many differences among his/her students and who realizes that the computer may not be for everyone.

Implications

1. Students' learning styles must be provided for in the use of computer programs.

2. Use of the computer may not be the best for every child.

3. Best results with computer programs are obtained by a knowledgeable teacher with a strong humanitarian sense enabling him/her to consider the uniqueness of each child as a challenge, not a threat.

4. Selection of software and making adaptations where needed are essential if the programs are to be successful.

5. It is believed that early intervention and selecting the right approach for each child having difficulty learning to read and write would save years of embarrassment and "pretending."

6. Teachers must be given adequate training in any program they are required to teach, and adequate in-service help should

always be readily available to them if the program is to be successful.

7. The companies whose computers and related materials are used should be asked to demonstrate and explain what they consider to be the best use of them. Teachers should feel free to question the representatives of the companies.

8. There should be much more empowerment of teachers. Good teachers "know" children and their needs.

9. Serious consideration should be given to developing skills and concepts across curriculum areas. Not only would this provide the opportunity for using software from different content areas, it would probably capture the interests of more students and thus support students' literacy development.

10. Teachers should share their success stories.

11. Parental involvement must be sought.

12. Teachers must not be given second place to technology. They can be a great help to it if given more "voice", adequate training, and continued support.

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